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B7V VBD

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UK CL (Edition K) B7V VAA VBD
INT CL[5] B63H

(54) Stowable rigid wingsail system

(57) A rigid wingsail system 1 for a vessel comprises a wingsail unit consisting of three rigid wingsails mounted between a boom 2 and a yard 3 and simultaneously rotatable through 180 degrees by means of track rods 4 connected to each wingsail.

The wingsail unit is itself rotatable within a tubular goalpost-shaped mast 5 for movement between a position with the wingsails in line astern and a position with the wingsails extending side-by-side to allow a wide variety of angle-of-attack of the wingsails relative to the centreline of the vessel.

The mast 5 pivots about a horizontal axis in a fore and aft direction, allowing the wingsail unit to be stowed horizontally (figures 3 & 4, not shown) when not in use.

The wingsails are of buoyant foam construction to help prevent the total capsize of the vessel. Additionally, the convex face of each wingsail may have built-in photovoltaic panels (12, figure 2 not shown) to supply electric power for the vessel.

Fig 1

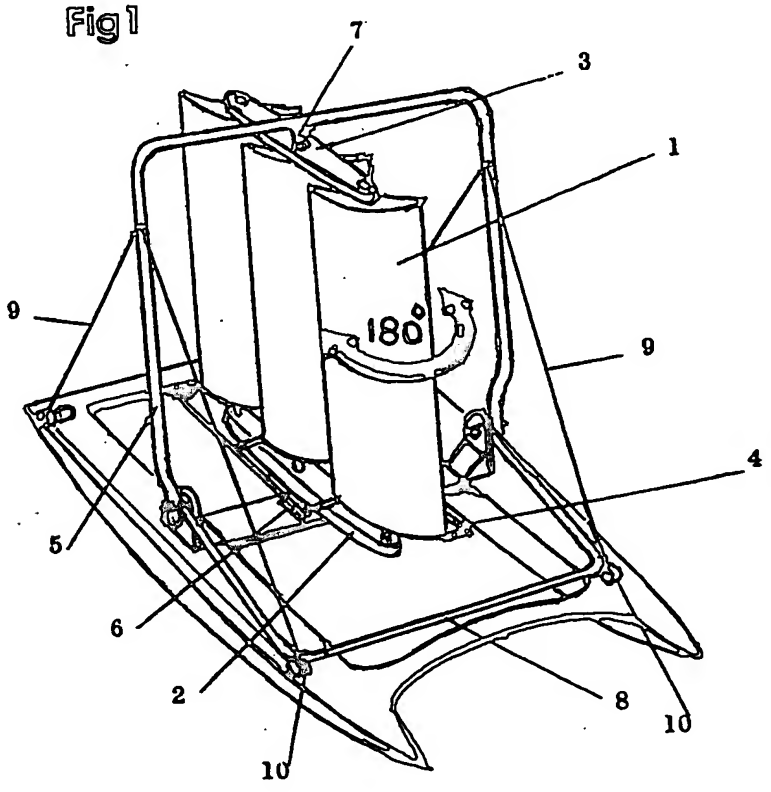

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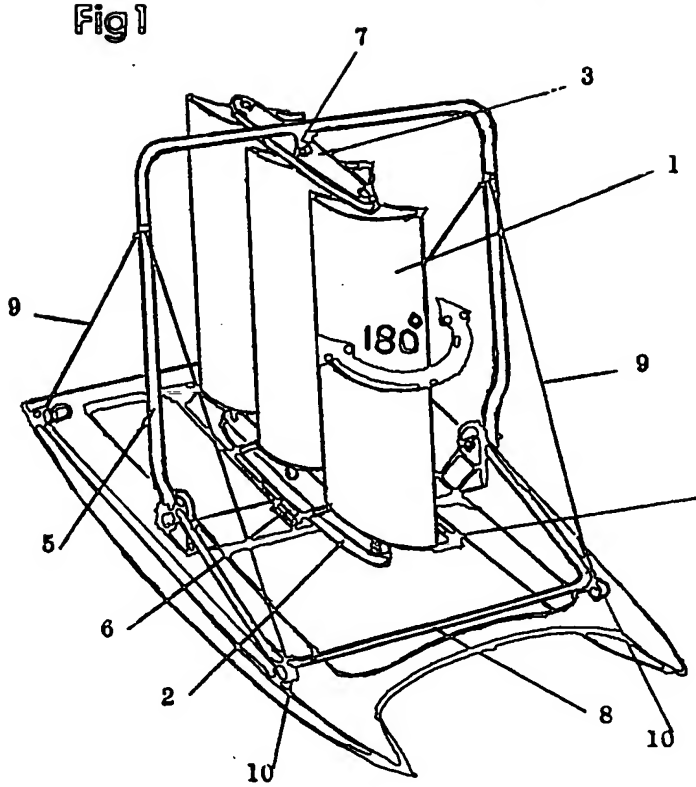
Fig 1



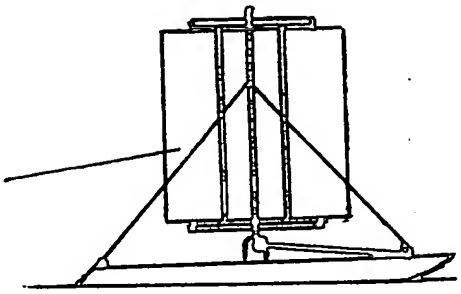


FIG 1 E

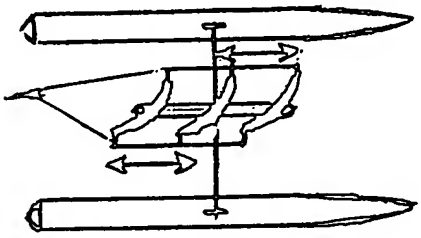
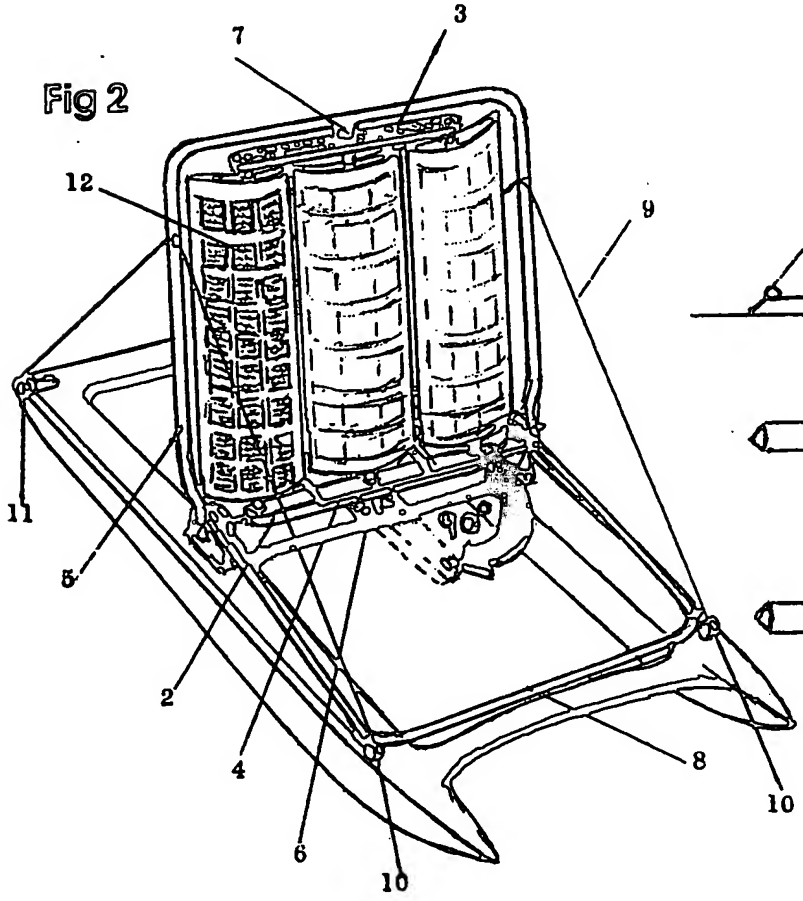


FIG 1 P

Fig 2



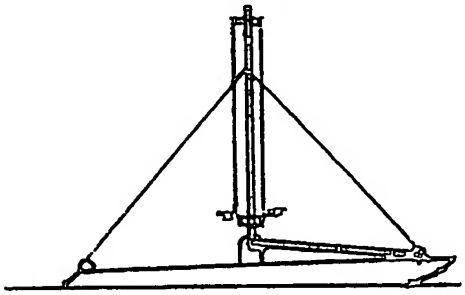


FIG 2 E

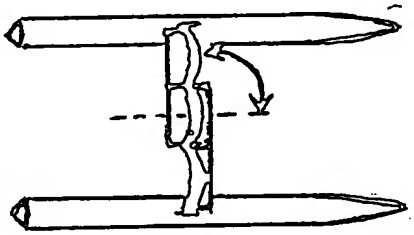
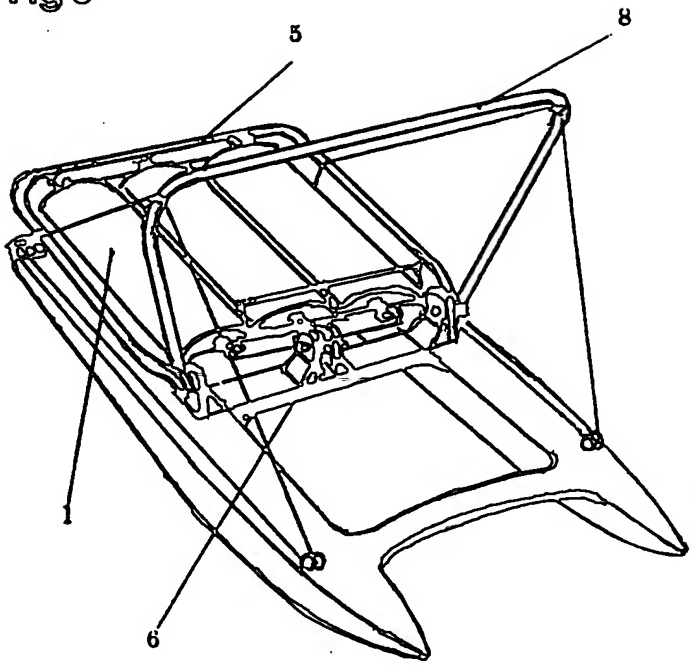


FIG 2 P

Fig 3



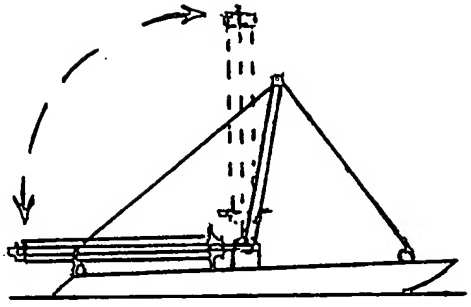


FIG 3 E

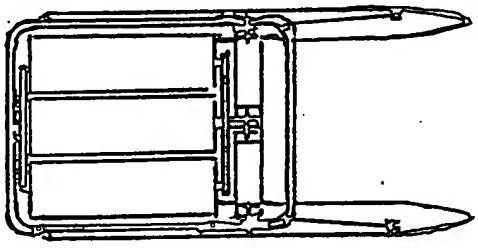


FIG 3 P

STOWABLE RIGID WINGSAIL SYSTEM

This invention relates to a stowable, rigid wingsail system for multihull sailing vessels.
Various forms of wingsail, either single or multiple, have been tried over the years in order to increase aerodynamic efficiency and eliminate the 'twist' inherent in conventional soft sails.

In order to achieve this improved efficiency however, the rigid wingsail has had to be robustly engineered as a permanently standing cantilever structure.
Even using modern materials and techniques, the rigid wingsail suffers from two main disadvantages: excessive weight aloft, and, more seriously, the inability to stow or furl the sails which must be left to 'weathercock' when the vessel is at rest or in harbour.

According to the present invention, the three rigid wingsails, which are lightweight, strong, and buoyant, are able to be set in a multitude of different positions and angles-of-attack relative to the centreline of the vessel, thus providing greatly superior control and manoeuverability to that of conventional sails.

The triple wingsail unit is mounted within a pivoting goalpost mast structure which allows the entire rig to be stowed flat when the vessel is at rest or under motor.
There are built-in solar photovoltaic panels covering the convex face of each wingsail, thus providing a vast...and hitherto unusable... area for generating electric power, particularly when the wingsail unit is lowered into the horizontal position.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 shows in perspective the triple wingsail unit mounted on a catamaran, the wingsail unit in the fore-and-aft mode for beating to windward.

Figure 2 shows in perspective the triple wingsail unit, the wingsails set flat and the boom swung athwartships (across the ship) for running downwind. The array of solar panels is shown on the convex face of each wingsail.

Figure 3 shows in perspective the triple wingsail unit lowered and stowed in the horizontal position.

Figures 1 - 3 , E & P show the respective elevations and plan views of vessel and wingsails.

Referring to the drawings, the triple wingsail unit comprises three identical , rigid, and buoyant wingsails, 1 , of crescent-moon section and 3:1 aspect ratio.

They are mounted vertically on bearings between a horizontal boom, 2, and yard, 3.

The wingsails are allowed to rotate simultaneously through 180 Deg., their movement controlled by two track-rods connected to their lower corners ,4. (C.f. The slats of a Venetian blind mounted in a vertical plane.)

The triple wingsail unit, together with its boom and yard, is mounted within a tubular goalpost mast, 5 , and supported at its base on a deck-mounted tabernacle, 6 , upon which it is able to rotate.

A bearing, 7, at the centre of the goalpost crossbar supports the yard at the head of the wingsail unit, allowing the entire unit to traverse from the fore-and-aft mode to the lateral mode.

The two functions...wingsail movement and boom traverse ... are controlled separately by electric servo-motors operating worm-and-wheel drives within the boom. (not shown)

In order to raise and lower the wingsail unit, the goalpost mast is pivotted at its feet, the axes being in line with the pivot-point in the tabernacle.

A tubular derrick-mast, 8, is also mounted on the goalpost pivots, and the whole structure is braced and supported by two continuous guy-wires, 9, which run from the goalpost mast forward to the derrick mast, down through two forward deck-blocks, 10, back along the deck to a pair of electric winches, 11, aft, and thence back up to the goalpost mast.
Thus, the guy-wires maintain a constant tension on the rig as it is raised and lowered.
An array of solar photovoltaic panels is built into the convex face of each wingsail, 12.

CLAIMS

1 A st vable rigid wingsail system comprising thr e identical rigid and buoyant wingsails f cr s ent-mo n section and 3:1 aspect ratio, mounted vertically on bearings between a boom and yard, and connected by track-rods allowing simultaneous movement through 180 Deg.

2 A stowable rigid wingsail system as claimed in Claim 1 wherein the triple wingsail unit together with its boom and yard, is mounted within a tubular goalpost mast and supported respectively at its base by a deck-mounted tabernacle, and at its head by a bearing at the centre of the goalpost crossbar, thus allowing the entire wingsail unit to traverse from the fore-and-aft to the lateral mode.

3 A stowable rigid wingsail system as claimed in Claim 1 and Claim 2 wherein the goalpost mast pivots in a fore-and-aft direction, allowing the wingsail unit to be stowed horizontally.

4 A stowable rigid wingsail system as claimed in Claim 1 and Claim 2 wherein the wingsail unit, using its two functions: wingsail movement, and boom traverse separately or in combination, offers a wide variety of positions and angles-of-attack relative to the centreline of the vessel.

5 A stowable rigid wingsail system as claimed in Claim 1 wherein the wingsails are constructed of lightweight foam material, thus providin sealed buoyancy and helping to prevent total capsise of the vessel.

6 A stowable rigid wingsail system as claimed in Claim 1 wherein an array of solar photovoltaic panels are built in to the entire convex face of each wingsail to provide electric power for the vessel.

7 A stowable rigid wingsail system substantially as described herein with references to Figures 1,2 and 3 of the accompanying drawings.

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